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JUPITER'S NEWLY DISCOVERED SATELLITES

Before Voyager the only small satellite thought to orbit closer to Jupiter than the Galileans was Amalthea. The Voyager data have revealed the existence of at least three other small satellites.

The first new satellite, 1979J1, was discovered in long exposure frames taken 23 hours before the closest approach of Voyager 2 to Jupiter primarily to study the Jovian ring. The two discovery frames are the only data that so far have been found for 1979J1, and they indicate that it has an orbit period of about 7 h, 8 min and is 30 to 40 kilometers in diameter. It orbits at about 57,800 km above Jupiter's cloud tops. 1979J1 was discovered in October 1979.

An attempt in March and April 1980 to find data confirming the existence and orbit of 1979J1 then led to the discovery of two other small satellites. A shadow was observed on the Jovian atmosphere in frames taken 4-1/2 h before Voyager 1's closest approach to Jupiter in March 1979. The shadow could not have been caused by any satellite known at the time, and an analysis of the motion of the shadow allowed a calculation of the satellite's orbit and a prediction of its reappearance in other Voyager 1 frames. It was subsequently found many more times in both Voyager 1 and Voyager 2 frames. This new satellite, 1979J2, was found to have an orbit with a period of 16 h, 11 min and to be 80 km in diameter. It orbits at about 151,000 km above Jupiter's cloud tops.

During this same search through Voyager 1 frames, a satellite/shadow pair was observed moving across the equatorial region of Jupiter. At first this satellite was thought to be the desired confirmation of the existence of 1979J1, since the satellite size and orbit inferred from the new data were very similar to those of 1979J1. A detailed analysis of this and other data, however, proved that this satellite would be in a position on the far side of Jupiter at the time of the original discovery frames of 1979J1. This new satellite, 1979J3, was subsequently found in Voyager 2 frames very near the position predicted from the Voyager 1 data and found to have an orbit period of 7 h, 4 min, 30 s, and to orbit 56,200 km above Jupiter's cloud tops. Its diameter is about 40 km.

Figure (opposite page): The largest of the three tiny new moons of Jupiter discovered by the Voyager Project is seen against the face of the planet. Its dramatic shadow is visible at the end of the dark streak in the Jupiter clouds (right center). The new satellite, designated as 1979J2, is only 80 kilometers in diameter and orbits Jupiter about 151,000 kilometers above the cloud tops.